



NORWEGIAN MAPPING
AUTHORITY

Ny-Ålesund: Norway's High Arctic Contribution to the Advancement of Global Positioning, Navigation & Timing

POSITIONING DATA – FOR THE BENEFIT OF SOCIETY

**National Space-based Positioning,
Navigation, and Timing (PNT)
Advisory board
Eight Meeting
June 9 -10, 2011**

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THE NORWEGIAN MAPPING AUTHORITY



- Hydrographic survey
- Mapping and Cadastre
- Land register
- Geodetic institute



Parliament proposition

“The Norwegian Mapping Authority will conduct scientific measurements to monitor climate and other global changes.”



From the Svalbard White Paper:



*“Substantial investments have been made in Ny-Ålesund over the past 10-year period. As a result, this site provides a very good and functional base for international scientific research and climate monitoring. The overall goal of these investments is **to develop Ny-Ålesund into one of the world’s leading sites for Arctic climate and environmental research.**”*



From the government's strategy for the far north

*“Norway will be a leader in the environmental area, and a long-term and credible administrator of environmental and cultural assets in the far north. **This requires us to take a leading role in monitoring climate, environmental toxins and the marine environment in the far north.**”*

CONTENTS

- NMA's contribution to a Global Geodetic Observing System (GGOS) as a part of the UN initiative GEOS.
- NMA activities at the Ny-Ålesund Geodetic Observatory at Ny-Ålesund, Svalbard
- We think:
An upgraded version of the Ny-Ålesund geodetic observatory – a fundamental station, will be a major keystone for the further development of GPS.



The contribution of the Norwegian Mapping Authority to a Global Geodetic Observing System (GGOS)



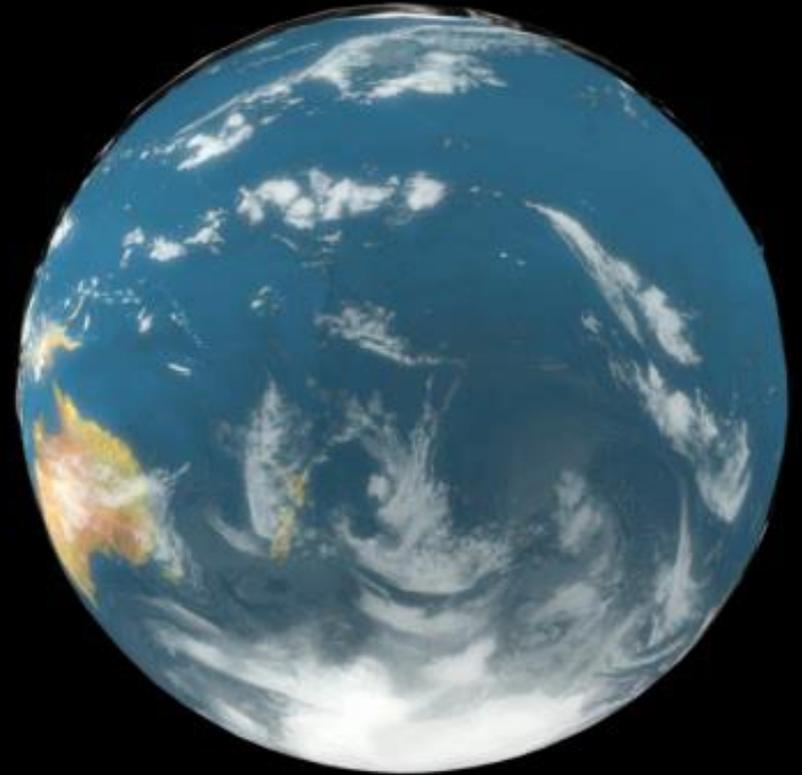
STATENS KARTVERK

POSISJONSDATA - TIL NYTTE FOR SAMFUNNET

Per Erik Opseth
Director Geodetic Institute
NMA

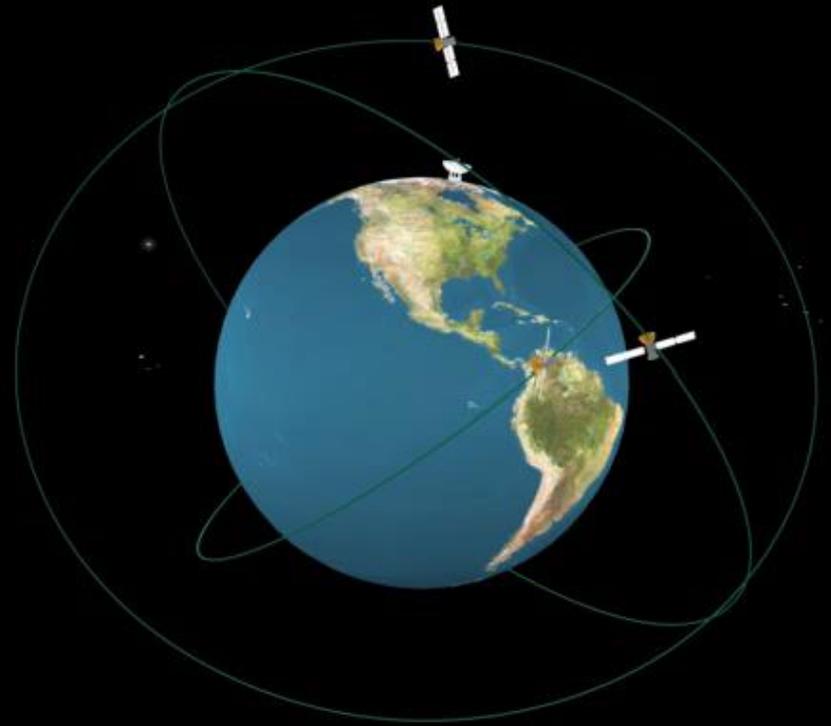
Everything is in motion – all the time

- Earth
- Continental drift
- Ocean circulations
- The Earth's rotation and position

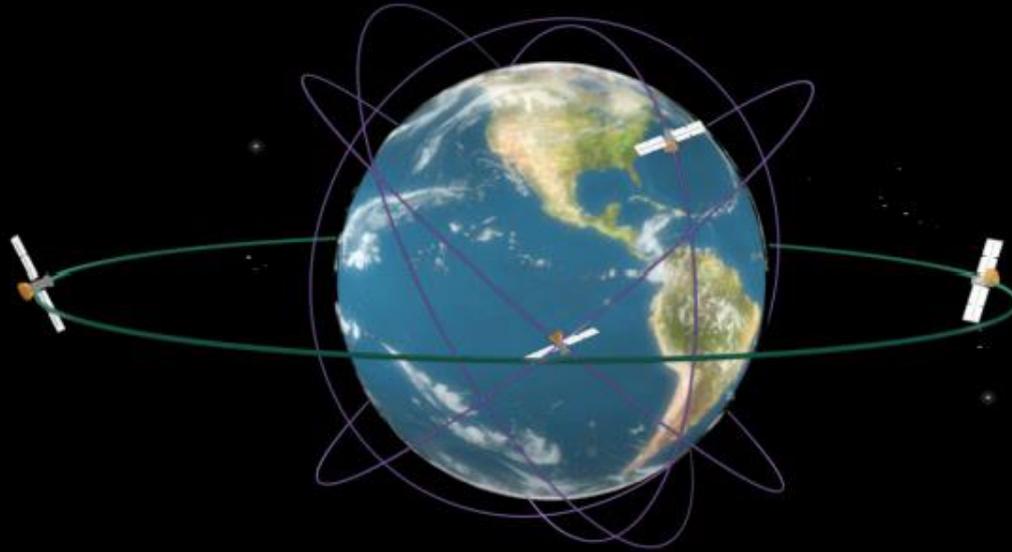


Today, Earth observations are from space

- Ice melting
- Tectonic plate motion
- Sea-level changes
- Ocean currents
- Weather observations



How can we monitor the Earth system when everything is moving?



We have to establish a long-term stable,
consistent, high accurate **reference frame**

The role of geodesy

- Collect and archive geodetic observations, products and models and ensure their consistency, reliability and accessibility.
- Identify a consistent set of geodetic products and establish the requirements concerning the products accuracy, time resolution and consistency.
- Ensure the stability and monitoring of the three fundamental fields of Geodesy that is: **Geometry – Earth Rotation – Gravity field**



Geodesy's contribution to the UN initiative GEOS

- A Global Geodetic Observing System based upon the space geodetic techniques VLBI, SLR/LLR, GNSS, DORIS, Altimetry, Gravity Missions combined with in-situ data.





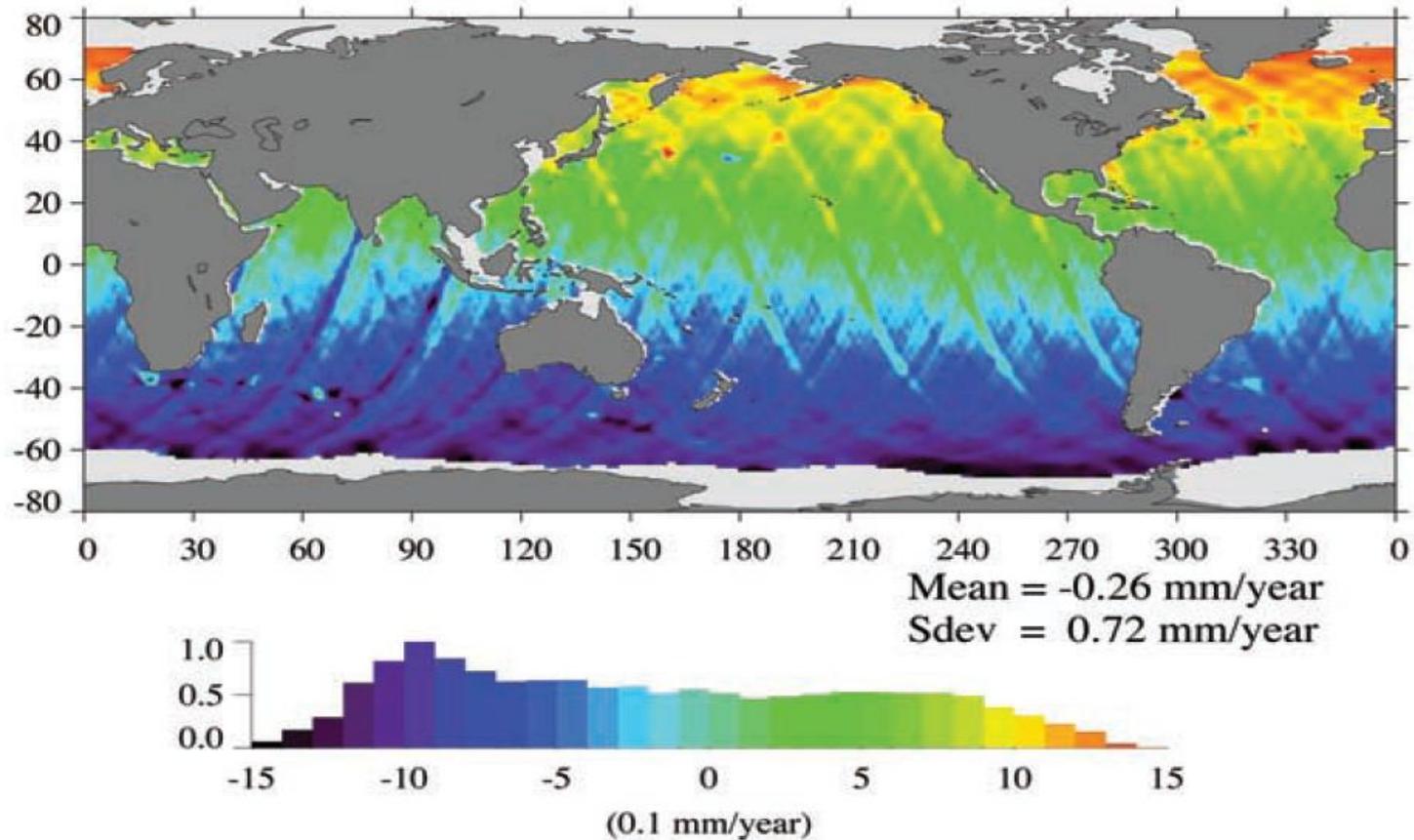
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GEOSAT

Combining Space Geodetic Measurements Simultaneously at the observation level

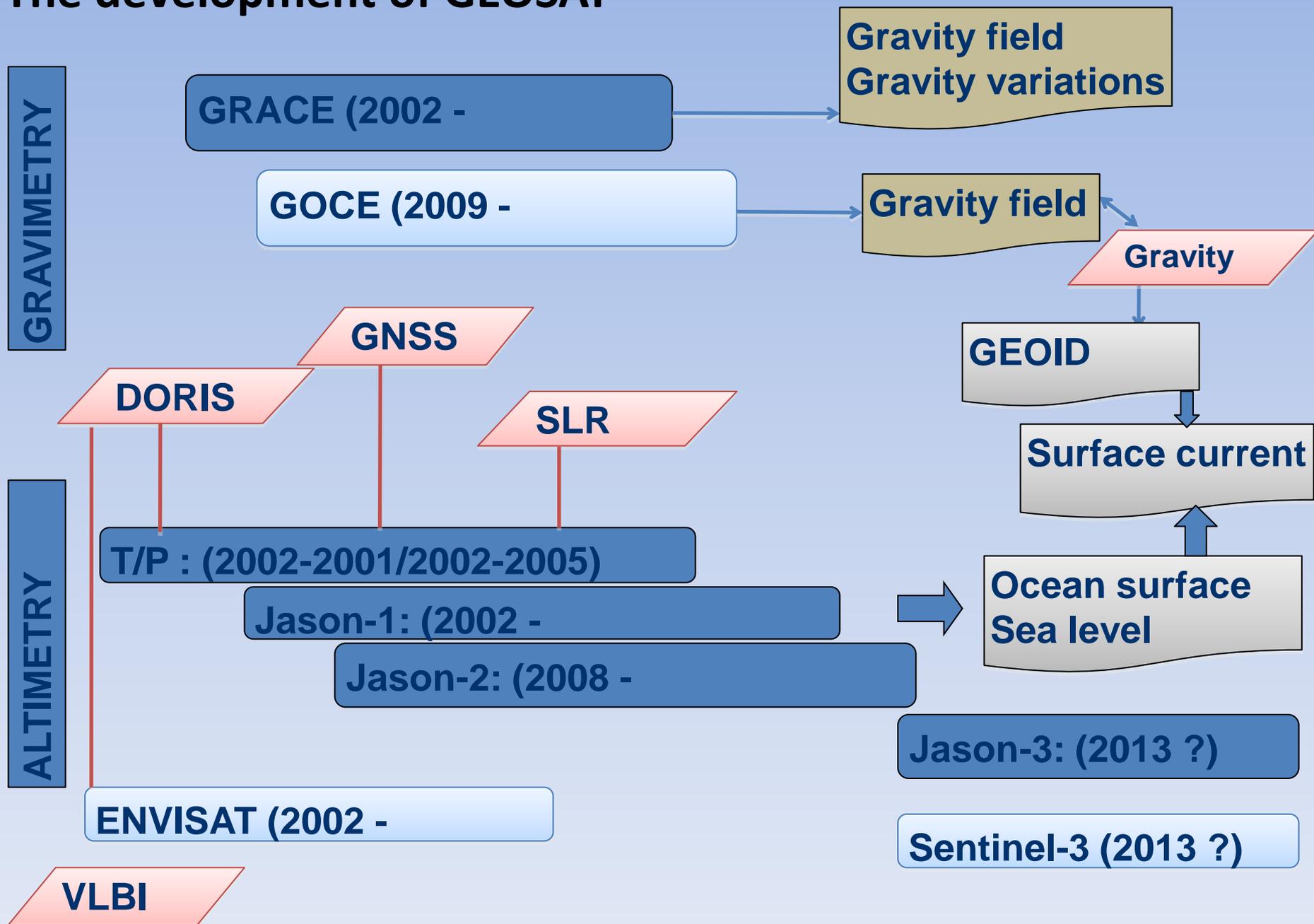
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Comparing two sea level solutions using two different orbits



[Beckley et al. 2007]

The development of GEOSAT



Planning a new geodetic observatory in Ny-Ålesund, Svalbard

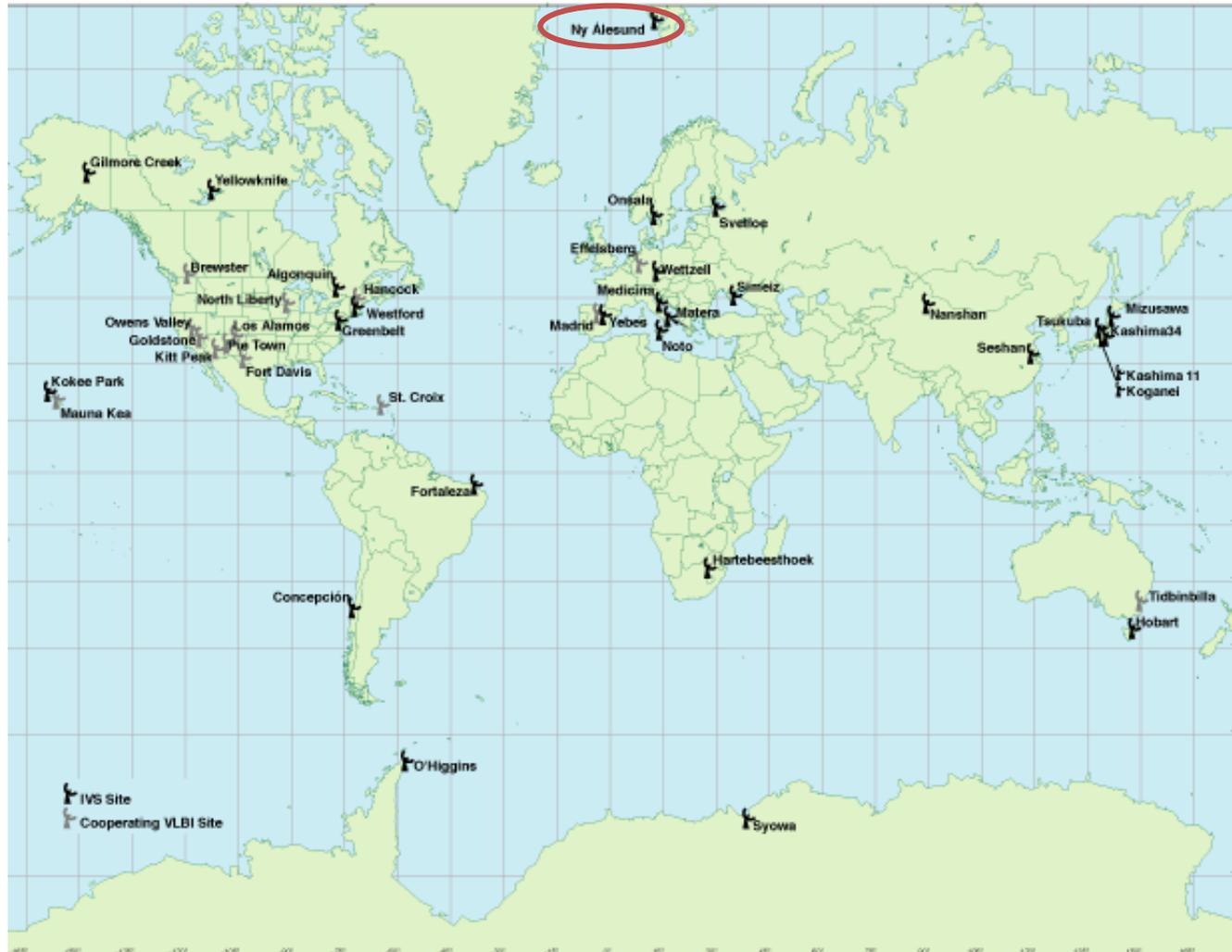


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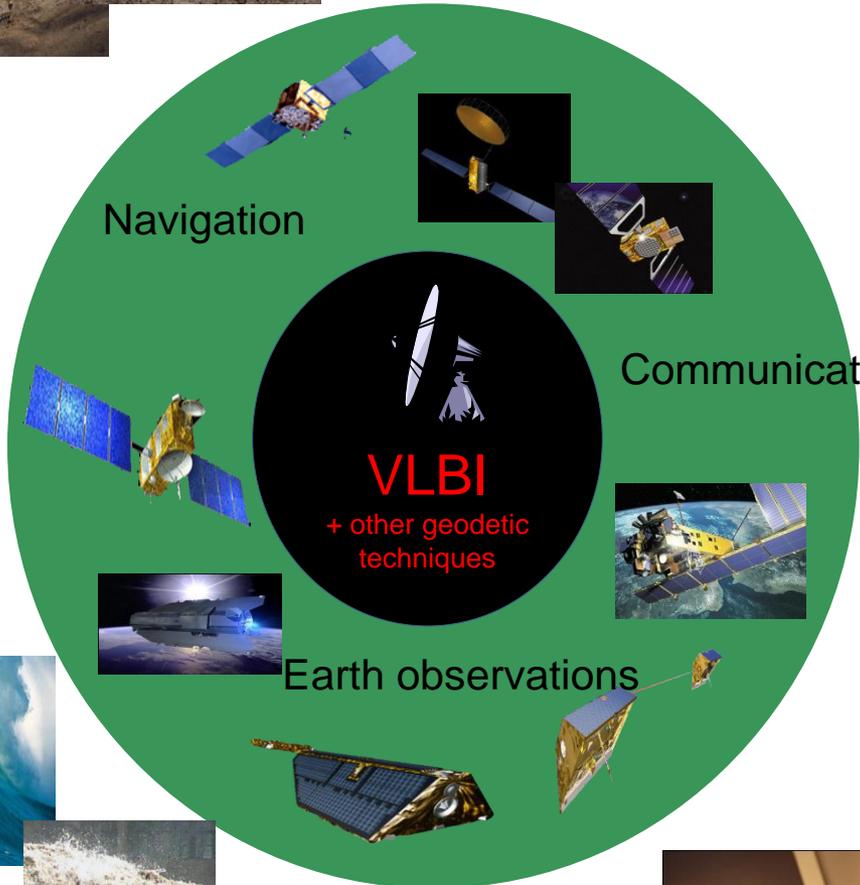
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A VLBI site in Ny-Ålesund is of global importance



USEFUL FOR SOCIETY!



Navigation

Communication

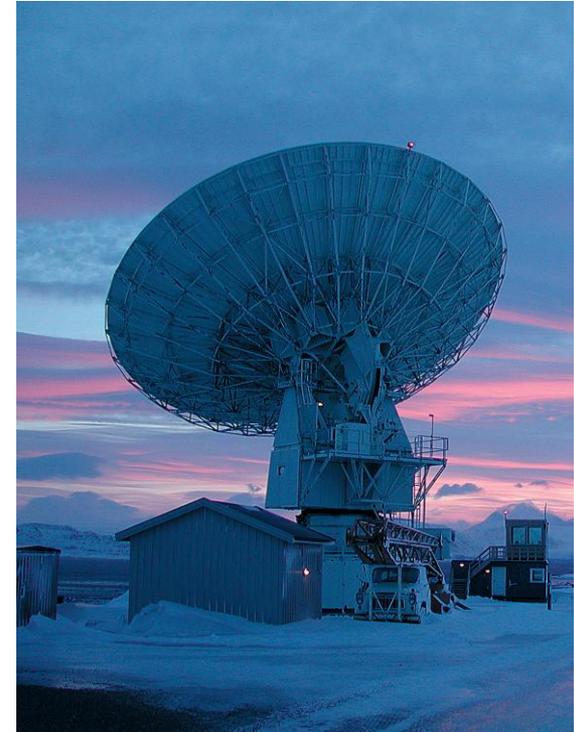
Earth observations

VLBI
+ other geodetic
techniques



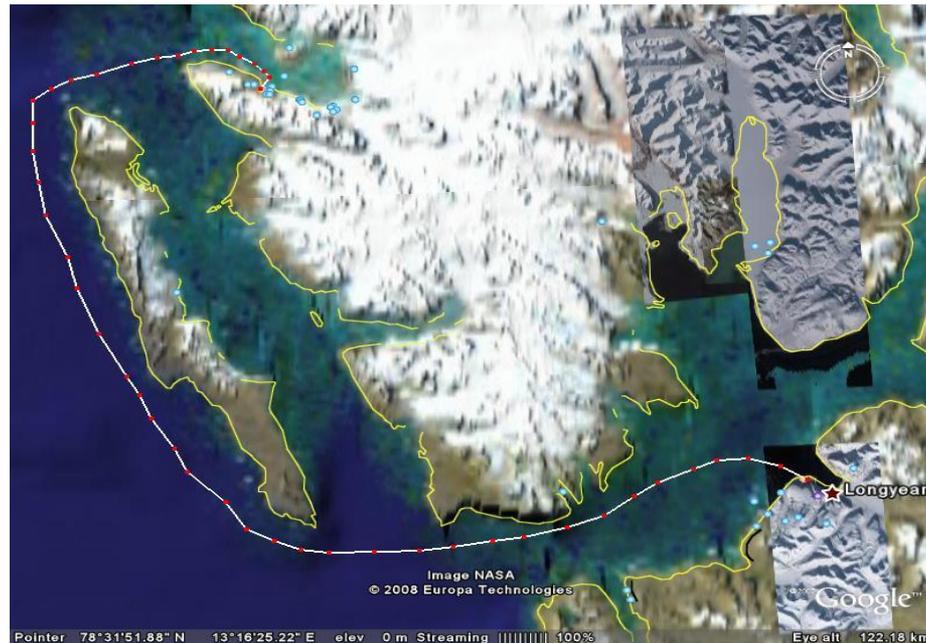
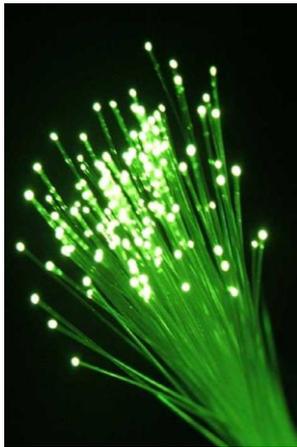
WHY MODERNISE?

- Modern society is dependent on VLBI observations (perhaps without fully realising it)
- Society requires improved reference frames and more precise data from satellites
- There is a need for accurate Earth observations
- Without the Ny-Ålesund observatory, the accuracy of EOP will reduce by 20-30 per cent.
- Establishing satellite laser ranging (SLR) in Ny-Ålesund improves the accuracy of Earth observations satellite orbits across the Arctic.
- The existing antenna is coming to the end of it's working life
- The only people who fully understanding the workings of the equipment are now retired
- We need to start now – it will take 8 years to complete the construction period.



A FIBEROPTIC CABLE ...

.... WILL ELECTRONICALLY CONNECT NY-ÅLESUND TO THE REST OF THE WORLD FROM 2013.



Summary

- Geosat will by the end of 2012 form the basis for NMA's contribution to IERS and the monitoring of global and regional sea level and ocean currents.
- A modern geodetic observatory in Svalbard will allow Norway to make a unique contribution to monitoring the effect of climate change, in line with Norwegian government policy on the far north
- The Norwegian Mapping Authority proposes to invest M\$40 over five years to upgrade the geodetic observatory at Svalbard in order to remain a key contributor to international joint ventures
- The VLBI network is based on the best effort principle from the participating countries. To be able to obtain funds from the Norwegian government, we will need your support to make the modernization.
- A fundamental geodetic station at Svalbard will help a further development of GPS.



To maintain a consistent modeling and interpretation of the Earth processes and interaction we need a selection of some “fundamental stations” with all the primary geodetic techniques installed,

i.e;

VLBI - SLR - GNSS - DORIS - Gravity –
Tide Gauge

**Our goal is to turn Ny-Ålesund to become a
“FUNDAMENTAL STATION”**

THANK YOU FOR YOUR ATTENTION!

